

NON-PUBLIC?: N  
ACCESSION #: 9109130187  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Grand Gulf Nuclear Station - Unit 1 PAGE: 1 OF 04

DOCKET NUMBER: 05000416

TITLE: Lightning Induced Spikes Causes APRM Scram  
EVENT DATE: 08/10/91 LER #: 91-010-00 REPORT DATE: 09/09/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: Riley Ruffin / Licensing Specialist TELEPHONE: (601) 437-2167

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

#### ABSTRACT:

On August 10, 1991, a severe thunderstorm was in progress in the site vicinity. During the storm, a lightning strike caused a spike on plant neutron monitoring instrumentation. The reactor automatically scrambled due to the spike simulating a high flux signal on the Average Power Range Monitors (APRMs). The spike caused two High Pressure Core Spray (HPCS) low water level channels to trip. HPCS did not initiate due to the short duration of the spike. Reactor water level decreased to -19 inches and was subsequently restored to normal by the feedwater system.

A functional check of APRM indications and HPCS trip units was performed prior to plant startup. No adverse effects were observed.

Following an evaluation, recommendations were made for extending the existing lightning protection system to provide expanded site protection. There was no degradation of safety systems or components as

a result of this occurrence.

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END OF ABSTRACT

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#### A. Reportable Occurrence

On August 10, 1991, the reactor automatically scrammed due to a lightning induced spike on the APRMs IG!. This Reactor Protection System JC! actuation is reported pursuant to 10 CFR 50.73(a)(2)(iv).

#### B. Initial Condition

The plant was operating in Operational Condition 1 at 100% power at the time of occurrence.

#### C. Description of Occurrence

On August 10, 1991, a thunderstorm with severe lightning occurred in the site vicinity for approximately twenty minutes. At approximately 1906, during the storm, the reactor scrammed due to a high neutron flux signal on the APRMs (channels C, G, D and H). It appears that the APRMs spiked due to a lightning strike in the fringe area of the protection arrays. Based on a review of the event, it was determined that the signal was of short duration (indicative of a spike). However, the spike was large enough to cause high flux trips on several APRM channels and several high flux alarms (channels B, E and F).

Also during the storm, two HPCS BG! low water level channels tripped, but the signal duration was not long enough for the logic to seal-in and cause a HPCS initiation.

Following the scram, the reactor vessel water level decreased to a minimum of -19 inches as indicated on control room level indicator B21-R623A before it was automatically restored to normal by feedwater. The main turbine automatically tripped on reverse power after the scram.

#### D. Apparent Cause

The cause of the scram is attributed to a high flux signal on 4 of 8

APRM channels.

Based on reviews of the occurrence, it has been determined that the most probable cause of the instrumentation spike was the excessive differential ground potential rise experienced by the coaxial cable feeding the APRM neutron flux monitoring panels during the lightning strike.

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A major contributing factor to the occurrence is the use of coaxial cables in the APRM system.

The most probable mechanism which allowed the lightning to penetrate the dissipation array was determined to be the 115kV static line which terminated on the east wall of the Turbine Building NM!.

Three previous similar events were reported in LER 88-012, LER 89-010 and LER 89-016. Installation of a lightning dissipation array for vulnerable areas was a result of the latter two reports.

The installed lightning dissipation array did not ensure positive protection from any form of induced transient which was caused by lightning strikes outside of the site lightning protection area. The lightning strike, which caused the surge in the differential ground potential on site and subsequent noise in the neutron monitoring system, was able to penetrate the protection array of lightning dissipation system.

#### E. Supplemental Corrective Actions

The static line from the 115kV dead end pole to the turbine building was removed. The 500 kV tower static lines to the turbine building will be removed during the next refueling outage.

A functional check of APRM indications was performed on August 11, 1991 to confirm proper response. No adverse effects were observed.

The HPCS functional check of vessel level trip units was performed on channels C and R. Proper actuation of the initiation logic was verified.

A walkdown was completed by plant personnel along with the lightning protection vendor. The walkdown revealed no sign of physical damage

within the protected area of the plant.

The vendor (Lightning Eliminators and Consultants) performed an evaluation and provided recommendations for extending the existing lightning protection system to provide expanded site protection. Expansion of the site lightning protection is scheduled for completion prior to startup from Refueling Outage Five.

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#### F. Safety Assessment

The Post Trip Analysis confirmed that all safety systems functioned properly and that plant response to these automatic actions was as expected. RPS response times were satisfactory when compared to expected or required times. HPCS did not initiate from a trip of the low water level channels due to the short duration between the time the trip signal was received and when it reset. Reactor water level remained at least 147 inches above the top of active fuel during the event. All Emergency Core Cooling Systems were operable but were not required to be automatically or manually initiated.

#### G. Additional Information

Energy Industry Identification System (EIIS) codes are identified in the text within brackets !.

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W. T. Cottle  
Vice President  
Operations  
Grand Gulf Nuclear Station

September 9, 1991

U.S. Nuclear Regulatory Commission

Mail Station P1-137  
Washington, D.C. 20555

Attention: Document Control Desk

SUBJECT: Grand Gulf Nuclear Station  
Unit 1  
Docket No. 50-416  
License No. NPF-29  
Lightning Induced Spikes Causes APRM Scram  
LER 91-010

GNRO-91/00165

Gentlemen:

Attached is Licensee Event Report (LER) 91-010 which is a final report.

Yours truly,

WTC/RR/cg  
attachment

cc: Mr. D. C. Hintz (w/a)  
Mr. J. L. Mathis (w/a)  
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